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U. S. DEPARTMENT OF AGRICULTURE,
 BUREAU OF ANIMAL INDUSTRY.—Circular No. 55.
 D. E. SALMON, D. V. M., Chief of Bureau.



REINDEER AND CARIBOU.

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[Reprinted from the Twentieth Annual Report of the Bureau of Animal Industry (1903).]



WASHINGTON:
 GOVERNMENT PRINTING OFFICE.

1904.

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The reindeer of Europe and Asia and the caribou of America are usually considered to belong to one and the same species, *Rangifer tarandus*, though some distinguished scientists recognize seven different species. For the purposes of this article they may be considered as one.

GEOGRAPHICAL DISTRIBUTION.

The reindeer constitutes one of the several genera into which the deer family is divided, and, considered from the standpoint of its usefulness to man, it is by far the most important member of this family. Its range in the wild state, though extensive, is confined to northern latitudes. On the American continent it is found from the shores of the Arctic Ocean along the Alaskan range, even below the boundary of the United States in the west, and in the east through Labrador to New Brunswick and Newfoundland, while on the plains it does not reach down so far. In Newfoundland, which is as yet but thinly settled, and the settlements located chiefly in the south and southeast portion of the Island, there are still large herds of caribou, which feed in summer on the barren highlands of the north and in winter migrate to the wooded districts in the south. Caribou, it is reported, are likewise still found in the hilly districts of New Brunswick and adjoining districts. In the interior of Alaska caribou is the most important game animal, though it is rapidly disappearing from the regions most frequented by the prospector and miner. In the Kenai Peninsula caribou are still found, but they are scarce. Its range is here almost identical with that of the moose. Both occupy the woods in winter and in summer both seek relief from mosquitoes by going to open ground, the caribou seeking the mountains, while the moose is more inclined to go to the grassy meadows along the seacoast to escape the pest. In the interior of Alaska there are still large regions unexploited where caribou are found in numbers, but they are scarce along the trails. In fact, they are nowhere numerous, except in the foothills of the range in which Mount McKinley is the principal peak. Small herds are scattered all through the northern plains of the continent to the Arctic Ocean.

In Europe it is found in the northern parts of Norway, Sweden, and Russia in the same regions as the domestic reindeer. In the Scandinavian range it extends well down toward the south, and in Russia it is said to be found throughout the whole length of the Ural Mountains, but not in the Caucasus. It is likewise found throughout the whole of northern Siberia and in the mountains as far south as latitude 52° . Reindeer are especially numerous in eastern Siberia, in Kamchatka, and in the region bordered by the Sea of Okhotsk, where they are largely domesticated. They have been imported into Iceland, where they have escaped from domestication and now run wild in great herds. They are found in Greenland, and, more wonderful still, in Spitzbergen, a group of islands in the Arctic Ocean nearly 400 miles north of Norway, stretching from latitude $76^{\circ} 30'$ to $80^{\circ} 30'$. Sportsmen have killed reindeer there by the thousand. This is, of course, a long way north of the northern limit of tree growth. The forest of more southern latitudes is here represented only by willows a few inches high. There are some flowering plants, but the principal vegetation consists of mosses and lichen, on which the reindeer feed. In short, the range of the reindeer and caribou is bounded by the isothermal line which determines the character of the vegetation on which they feed. They apparently prefer a species of lichen (*Cladonia rangiferina*), which for this reason is commonly called "reindeer moss," but they eat also other cryptogams, and they are very fond of mushrooms. In summer they browse much on willows and other brush, as well as grass.

In a former epoch the reindeer inhabited all of Europe, even down to the Mediterranean, having apparently been driven south by the advancing ice. Its remains have been found in France and elsewhere in continental Europe and in Scotland and in Ireland.

TWO RACES OF CARIBOU.

It may be noted here that in America there are two races of the caribou, commonly named after the range they occupy. One is called the Woodland caribou, and occupies the southern limit of the range; it feeds largely on grasses, and migrates southward in summer. The other, which is known as the Barren Ground caribou, follows the receding cold weather to the northward in summer, and goes to the woods, when it goes there at all, only in winter. The two differ in size, the northern type being the larger; they differ also in the antlers, which in the northern type are more palmated—that is, flattened—than in the southern type. These and other slight differences may be sufficient to separate the species—they are certainly varieties; but it is worth noting that no one thinks of erecting new species among our domestic cattle. And yet there are more marked differences between

a Jersey and a Galloway, for instance, or a Merino sheep and a Black-faced Scotch, or between a racer and a Shire horse, than between these groups of the reindeer.

DESCRIPTION.

Reindeer vary much in size. An abundant food supply is an important factor in their development, as in the case of other animals. Again, breed—perhaps we should call it race—characteristics are another factor influencing size. In some portions of Siberia the reindeer is much larger than in Lapland. Some domestic deer in that region stand 5 feet high, can carry 200 pounds on their backs, and are quite generally used for riding. There is more variation in size among the wild deer than among domesticated ones, the largest being found among the former; but, on the other hand, taking a large number, the domesticated deer will average larger than the wild.

Compared with other members of the deer tribe, it is not a graceful animal. The head is large, muzzle broad, neck short, set low, and usually carried horizontally. When the animal walks the top line of the neck is below that of the back. The withers are high, reaching above the line of the back; shoulders rather heavy, with prominent shoulder points, though when the animal is in good condition they blend pretty well with the thick base of the neck. The back is narrow, rump sloping; hind quarters light; flank low and quite full; underline nearly parallel with the back. In the fawns the legs seem disproportionately long, but in the mature animal they appear, on the contrary, rather short; the forelegs are straight, but the hind legs are crooked and spreading outward from the hock as if to brace the hind quarters and prevent their wobbling sidewise. The feet are large, and the hoofs spread when pressed against the ground—a provision of nature which aids the animal to get over soft snow or mud.

In color the caribou is grayish brown, darker in summer, lighter in winter; and while this, too, is the prevailing color of the domestic reindeer, the latter vary more than the wild ones, some being spotted, others almost white. All are lighter on neck, shoulders, and belly than on the back. The coat is exceedingly thick, longer in winter than in summer, and under the neck the hair is some 5 or 6 inches long, but there is no mossy undercoat such as most animals indigenous to arctic latitudes have. One peculiarity of the hair of the Alaskan caribou is perhaps worth mentioning, as I have not seen it referred to elsewhere, and that is that most of the hairs are more or less flattened, not cylindrical; the cross section is oblong, and in some cases they are as much as three times broader than thick. Moreover, the individual hairs are sinuous, the wave lines being on the edges of the hair, so that they do not appear wavy when viewed on the edge. The hair is

exceedingly brittle and breaks off readily when handled. For this reason caribou and reindeer skins do not make good rugs. They litter the floor continually with broken hair. The summer skins are better in this respect than the winter skins. The hide is thick and impervious to water to a marked degree, and by a certain mode of tanning practiced by the Lapps it can be made perfectly impervious. On the face and lower part of the legs the skin is particularly thick and durable, for which reason the Lapps use these portions for footwear.

A unique characteristic of the species is that both males and females have horns or antlers. They shed them annually in March and April, after which a new pair immediately start to grow. The young animal has cylindrical horns—nearly straight—which grow to a foot or more in length the first summer, but as it grows older the horns become palmated and curve outward and backward, and prongs, or branches, increase in number annually up to the age of seven or eight years. From that time the prongs decrease in number until in old animals there may be only a few points on the outer ends of the horns. In the prime of life one or both horns produce prongs which reach down over the face, called "brow antlers." The size of the antlers varies with the size of the animal. Antlers of females are smaller than those of males. Occasionally a pair of antlers is found measuring 4 feet in length and weighing as much as 40 pounds, but this is extreme; half of these figures more nearly represents the average. It is not easy to see just what function they fulfill in the animal economy. They appear to be a hindrance rather than a help in the struggle for existence. It must be a vast drain on the system to furnish nourishment for their rapid and prodigious growth, and they are tender and of little use for defense during the summer months while growing. They are at this season covered with skin, which is abundantly supplied with blood vessels and a fine coat of hair, when they are technically said to be "in the velvet." They are full grown about the time the breeding season begins in the fall of the year, and then the bulls use them freely on each other, but otherwise they are not often used for either defense or offense; instead, they strike their antagonist with their fore feet. The horn is soft, spongy, and not strong. Nor does the animal use the antlers in digging away the snow to reach the moss underneath, according to the observations of reindeer herders and others; this is done with the feet and nose.

The writer has not learned if any of the modern dehorning fluids have been used to suppress the growth of horns on domestic reindeer, but it would appear to be a subject worth experimentation. So far as known, the natural life of the caribou is about fourteen years, as is also the case with the reindeer. It does not reach its prime until six or seven years old.

DOMESTIC REINDEER.

We have no means of knowing when reindeer were first caught and tamed by savage man. They were doubtless first captured and confined with a view to having a food supply handy. Later he also found that his fleet-footed captive could be made to draw him over the snow, and this is as far as he has reached to-day. They have been domesticated for ages by the Laplanders, or rather by that portion of them who live a nomadic life, for most of the Lapps are fishermen and farmers. The reindeer is also domesticated by the Mongol tribes of Siberia, but to what extent is not fully known. It is known, however, that individual owners in that region hold herds of 15,000 animals or even more. One interesting feature of the deer in that region is that certain breeds or races of them are larger and much more powerful than the Lapland deer and, in consequence, are of greater service to man. This is especially true of the breed of deer kept by the Tunguse tribe in eastern Siberia. It was to introduce these large deer into Alaska that Lieut. E. P. Bertholf, of the United States Revenue-Cutter Service, visited Siberia in 1901 and, as we shall see, succeeded in landing about 250 head of them at Port Clarence.

The reindeer people, whether they live in Lapland or in Siberia, are all nomadic. They have to be. The deer, which live in large flocks, must be moved from place to place in search of pasture. The people consequently have no fixed abode, but live in tents, both winter and summer. They take the reindeer to the woods in winter and drive them to the mountains and open tundra in summer. Some of the people have log houses for winter use, located at various points on the range; others live in tents always. This is, of course, not conducive to a high state of civilization. Herding deer is in most respects like herding sheep. They must be kept together to prevent their straying off and becoming lost; they must be protected from wolves and other predaceous animals, and the sick ones and the fawns must be looked after. In return for this care the reindeer supplies nearly all the frugal wants of its owner. The meat is his chief food; from the milk he makes cheese, or in winter he keeps it in frozen chunks for use in coffee or for cooking, or it is evaporated and kept that way, or it is made into butter; the blood is saved and eaten; the fat is used for food, for candles, and for making footwear and clothing waterproof; the skins are used for tents, for clothing, for mats and blankets, for boots, for lassoes, for straps, and for thongs; the bones and horns are used for tools and utensils and, together with the hoofs, are used in boiling glue; and the animals are his burden bearers and motive power while they live. By the aid of the reindeer their owners maintain an existence where they otherwise would starve.

REINDEER IN ALASKA.

The name of Dr. Sheldon Jackson is inseparably connected with the introduction of reindeer in Alaska. It was due to his initiative that the work was begun and it is due to his persistent, unflagging efforts that it has been continued. When he first began his efforts were greeted with scoffing and ridicule. Elaborate arguments were advanced to prove that reindeer could not thrive in Alaska and that the attempt must end in certain and disgraceful failure. But he followed his plans undismayed. He succeeded at length in convincing Congress that it was the cheapest and easiest way of preventing the starvation of some thousands of Eskimos. Now the work has advanced so far as to prove beyond peradventure that reindeer will thrive in Alaska. The Eskimos are learning to handle them; the herds located in various places in the Territory are increasing fast; the white people who have seen the progress of the work have learned to appreciate the deer, and the voice of the scoffer is now but seldom heard. Some day a monument will be erected to Dr. Sheldon Jackson to commemorate this feature of his work and the benefits he thereby conferred on the natives.

The story of their introduction is most interesting. I will briefly note the salient points, derived chiefly from Doctor Jackson's reports on the subject.

Doctor Jackson visited arctic Alaska in 1890 for the purpose of establishing schools, a task which had been assigned to him by the Commissioner of Education. He found the Eskimos more in need of food than of schools. They were slowly dying of starvation and disease. Their condition had been changed for the worse by the influx of the white man. The relentless hunt of the whale and the walrus in steam vessels had largely reduced the number of these animals, or else they were driven beyond the reach of these poor people with the appliances at their command to pursue them. Thus their main food supply was lost. The fur animals had been hunted until well nigh exterminated, and the Eskimo could obtain but few furs to barter for food. The wild caribou, or reindeer, which had roamed over the tundra, were also killed off or driven away. Add to this the corrupting influence of the introduction of intoxicants and the vices of the white man, and it will be seen that their condition was pitiable.

In casting about for means to help them, it occurred to Doctor Jackson that the introduction of the reindeer would meet their wants. So soon as the deer were sufficiently numerous it would give them a permanent food supply and forever settle the question of starvation. He realized also that there were many and formidable obstacles to such a scheme. It was a task that it would take many years to accomplish, and the Government and people must be converted to the plan before it could be undertaken at all; and it meant that the modes of life of



REINDEER HERD, BARON KORF BAY, SIBERIA.

Illustration loaned by Dr. Sheldon Jackson.



HOBBLING REINDEER FOR LOADING ON SHIP.

Illustration loaned by Dr. Sheldon Jackson.



FREIGHTING WITH REINDEER.

Illustration loaned by Dr. Sheldon Jackson.

the Eskimos must be changed to some degree from a hunting to a pastoral life.

On his return to Washington he advocated an appropriation by Congress for the purpose of purchasing reindeer in Siberia and transporting them to Alaska. The proposition was new; it took time to convince Congress of the practicability of the plan, and the first bills to that end failed to pass. Meanwhile Doctor Jackson, firm in his conviction, and with the approval of the Commissioner of Education, to whom likewise much credit is due for his cordial cooperation, appealed to the public through the press—described the condition of the Eskimo people and asked the aid of charitable persons to inaugurate his scheme. “The response was prompt and generous.” He received something over \$2,000, and by the aid of a revenue cutter in arctic waters, assigned by the Secretary of the Treasury to transport the deer, he proceeded to procure the first reindeer from the semisavage tribes in Siberia.

This first importation consisted of only 16 head. They were landed in Unalaska in the autumn of 1891. During the summer of 1892 he made five visits to Siberia and purchased and imported 171 head of reindeer. These were landed at Port Clarence, where, on the 29th of June in the same year, an institution for their breeding was established and named after Hon. H. M. Teller, Senator from Colorado, who had taken much interest in the enterprise.

In 1893 Doctor Jackson purchased in Siberia and added to the Alaska herd 127 deer, and 79 fawns were born to the herd already imported. In the same year Congress made the first appropriation for this work—“\$6,000, to be expended under the direction of the Secretary of the Interior, for the purpose of introducing and maintaining in the Territory of Alaska reindeer for domestic purposes.” Siberian herders were employed at first, but it was soon realized that the Lapps were the best teachers for the Eskimos, and so in 1894 seven Lapp herders were brought over from Norway. For their traveling expenses Doctor Jackson again had to call upon private beneficence. He also hired a superintendent of the work, Mr. W. A. Kjellmann, who proved himself most efficient. The work was now fairly started. Congress increased the appropriations as follows:

1894	\$6,000	1900	\$25,000
1895	7,500	1901	25,000
1896	7,500	1902	25,000
1897	12,000	1903	25,000
1898	12,500		
1899	12,500	Total	158,000

In the meantime there was a steady progress in the growth of the herd. Some importations were made every year except in 1896 and 1897. The average increase in the herd for ten years has been 42 per cent. This is not the percentage of the fawns born, but the percent-

age of fawns which lived through the year in which they were born. The following table gives a clear and concise view of the growth of the herd:

	1892.	1893.	1894.	1895.	1896.	1897.	1898.	1899.	1900.	1901.	1902.
Total from previous year.....	143	323	492	743	1,000	1,132	1,877	2,538	2,792	3,464	
Fawns surviving	79	145	276	367	466	625	638	756	1,120	1,654	
Purchased during summer.....	171	124	120	123	.....	.....	161	322	29	500	30
Imported from Lapland.....						144	.....			
Total October 1.....	171	346	588	891	1,100	1,466	2,062	2,837	3,323	4,412	5,148
Sold, butchered, or died....	28	23	96	148	100	334	185	299	531	948	.....
Carried forward.....	143	323	492	743	1,000	1,132	1,877	2,538	2,792	3,464	.....

This includes, among the killed for the year 1897, 180 deer driven to Point Barrow to feed the starving whalers and 66 which were lost or killed on the way up there. I regret that I have no later data at my disposal; but from the above it seems safe to assume that on the 1st of October, 1903, there were 7,000 reindeer in Alaska. This is a remarkably successful showing; and even if no more were introduced, Alaska could be stocked from the present herds. At a rate of 40 per cent annual increase there would by 1910 be upward of 70,000 reindeer in Alaska. It is probable, however, that there will be a greater percentage of losses as the number increases for the reason that they must be scattered more and more among the inexperienced natives, who can not give them the same care they have so far had under Government supervision, and, with the increase, more will probably also be slaughtered for food. There should be no cessation in the importations for several years to come. It will take many years under the most favorable circumstances to fill the territory with all it can support. Doctor Jackson estimates in his report for 1895 that there are 14,000 square miles of deer pasture in Lapland, and that there are 23 reindeer to the square mile. On the same basis he also estimates that it will require 9,000,000 head to stock Alaska. Of course, this is only tentative. Lapland is more densely populated than Alaska is ever likely to be, and fewer deer will supply the wants of the people.

PRACTICAL TESTS.

The first notable example of the endurance of reindeer in Alaska and their adaptability to winter travel was a trip made in the winter of 1896-97 by W. A. Kjellmann while he was superintendent of the Teller Reindeer Station. He left Port Clarence in the middle of December, 1896, and traveled southward to the Kuskokwim River, about 1,000 miles distant, and returned to the station April 25, having accomplished 2,000 miles, through a rough and barren country, in

the worst season of the year, the reindeer obtaining their living from the moss which they dug out from under the snow.

The second practical demonstration of the value of reindeer was made in the winter of 1897-98, when a relief expedition in charge of Lieut. D. H. Jarvis, of the Revenue-Cutter Service, was sent overland to the shipwrecked whalers at Point Barrow. The expedition was a success, and the leaders in it, First Lieut. D. H. Jarvis, Second Lieut. E. P. Bertholf, and Surg. S. J. Call, were awarded gold medals and the thanks of Congress. On December 16, 1897, Lieutenant Jarvis and his companions started from a point some 300 miles south of St. Michael and proceeded northward, first with dog teams and later partly with reindeer and partly with dogs. Some distance above Nome the herd of a native, Charlie Antisarlook by name, was secured. Charlie had been an apprentice at the Government reindeer station and had become a skillful manager of the deer. At Cape Prince of Wales a herd of nearly 300 animals, belonging to private parties, under the management of W. T. Lopp, was secured, and Mr. Lopp volunteered to drive them to Point Barrow, a distance of 800 miles. They were to be used for food to succor the 300 whalers who had been frozen in at that point without sufficient provisions. The hardships of this trip through a barren, unpeopled country, with the temperature from 20° to 50° F. below zero, and blizzards raging much of the time, can be better imagined than described. The undertaking was a success. That the deer could be driven through such a country in large number, find their own food, arrive safely at the destination, and there drop a large number of healthy fawns is evidence of the value of the reindeer to people who live in the Arctics. Dogs must carry their food with them; reindeer scrape the snow away and feed on the moss they find underneath. Numerous other tests have been made, though less severe. Reindeer have been employed to carry the mail for several winters between the settlements scattered along Bering Sea. In short, it has been proved to the satisfaction of every fair-minded person who has taken the trouble to post himself on the subject that reindeer are an unqualified success, both as a means of transportation and as a source of supplies for most of the necessities of life in that region.

TUNGUSE DEER.

In that portion of northeastern Siberia which is contiguous to the Sea of Okhotsk lives a tribe known as the "Tunguse people." Reindeer breeding appears to be their main industry, and their deer are of a much larger type than those found either in Lapland or Kamchatka. To introduce a stock of these deer in Alaska Lieut. E. P. Bertholf, of the Revenue-Cutter Service—the same gentleman who had accompanied Mr. Jarvis on the expedition to Point Barrow—was sent to Siberia

in the spring of 1901. He traveled from New York to St. Petersburg and 6,000 miles across Russia and Siberia to his destination. It was an eventful and interesting trip. A few quotations from his report to Doctor Jackson, published in the latter's report for 1901, will serve to give an idea of the kind of deer he was after and the way the natives use them:

These Tunguse deer were big fellows * * * and they stuck to their work steadily. Notwithstanding the difficulties, we made excellent time, and by 2 p. m. we had gone some 12 miles, including 7 miles of road breaking. Here we came upon a tea caravan of 40 sleds and 100 deer that had been stalled for three days by the storm. * * * The deer in this part of the country are very much domesticated and tame, and when they are allowed to feed the drivers never tether them but turn them loose to wander as they will. When ready for a start one man rounds the deer up and drives them to camp, where the rest surround them and inclose the herd with a long hide line, which is stretched along between the men. The animals stand very quietly while some of the drivers pick up the halter lines that have been trailing in the snow, and the deer are then led to the different sleds and harnessed. I never saw an occasion on our whole route when it was necessary to lasso a deer. When traveling the driver uses a switch with which to touch up a lazy deer.

Again he says:

The Tunguse deer are certainly magnificent animals, for they can carry a full-grown man several miles through very deep snow. In fact, when we were sighted from this camp, two Tunguse came out to meet us, riding deer that at times sunk in the snow nearly to the shoulder. The Tunguse who own reindeer do not remain long in one place, for they are of necessity wanderers, being obliged to shift camp frequently to keep their deer on good feeding ground. In these shifting about the deer are utilized not only as draft but as pack animals, particularly when the snow is deep.

Speaking of their use for freighting, he says:

During the winter over 1,000 sleds leave Ola at different times, bound for Cemechan, in caravans of about 100 each. With a caravan of about 100 sleds belonging to one outfit there would be about 10 men, each man managing a train of 10 sleds, he driving the head team, while the other teams are tied by their halter lines to the sled in front. As each sled has two deer, and each train extra deer for emergencies, it will be seen that some 2,500 reindeer are used on this caravan route. Fifteen poods (540 pounds) per sled makes a total of at least 15,000 poods (270 tons); and as the difference between the cost of the deer caravans from Ola and the old horse caravans from Yakutsk, both bound to the same place, is \$4 a pood, over \$60,000 is saved to the Government yearly by the establishment of this deer caravan route from Ola to the Kolima River.

Concerning their use as pack animals, he says:

During my travel in the winter I had seen the reindeer used extensively with the saddle, especially in deep snow; but while I had noted their occasional use as pack animals, it was by no means general. Now, however, in the summer, I found they were used entirely as beasts of burden. In winter, when sleds can be used, two deer draw a load of from 15 to 20 poods, or from 540 to 720 pounds, thus transporting from 270 to 360 pounds per deer. That amount is not considered excessive, and the animals plod along with such a load day after day. When used as a pack animal, 150 pounds are considered the proper weight for the pack, though some animals can carry 200 pounds and more.

After much trouble Lieutenant Bertholf succeeded in purchasing 428 head of these large deer, and a ship was chartered to bring them to Alaska. However, owing to rough weather, 174 of these deer died or were killed on the voyage, and only 254 were landed at Teller Reindeer Station, Port Clarence.

TRAINING THE DEER.

Reindeer are naturally wild, and it takes much time, patience, and skill to train them so they can be handled without much trouble. Their wildness is in large measure due to the fact that they are usually bred in large herds, and individual animals are therefore not accustomed to be handled by the herders, who confine their attention in this respect to the few trained sled deer. The training begins when the deer is 3 years old. Generally the stoutest males and geldings are selected. Females are also trained, but they are smaller and less enduring. The training begins by lassoing the selected animals, thus separating them from the herd. The poor beasts are much scared, and jump about in frantic efforts to escape. The trainer advances hand over hand on the rawhide lasso till the head is reached. They are then sometimes given a little salt, of which they are fond; they are then led about for some time or tied to a post to accustom them to confinement and, the lesson over, again released. This is repeated day by day, and when sufficiently tamed they are harnessed and in the same manner gradually accustomed to draw light loads. This takes a long time and persistent work. They should not be worked before they are 3 years old. At 6 or 7 they reach their prime and then gradually decline.

In regard to driving them, Lieut. D. H. Jarvis makes the following observation in his report:

All hands must be ready at the same time when starting a deer train, for just as soon as the animals see the head team start they are all off with a jump, and for a short time keep up a very high rate of speed. If one is not quick in jumping and holding onto his sled, he is likely either to lose his team or to be dragged along through the snow. They soon come down to a moderate gait, however, and finally drop into a walk when tired.

DEER HARNESS.

There are at least three ways of harnessing deer—one in Siberia and two in Lapland. Lieutenant Bertholf makes the following observation on the Siberian method:

They are harnessed in pairs by a very simple arrangement—a plain loop of rawhide about 2 inches wide that goes over the off shoulder and between the fore legs. These loops are made fast to a single piece of rawhide that goes over the bent sapling on the front end of the sled runners, allowing it free motion. This makes both deer pull together, for if one gets ahead the other's hind legs hit against the sled and he is spurred on.

That is, the animal pulls by the left shoulder, the loop or strap referred to passing over the withers and between the legs, as when one ties a sash over the shoulder. The trace is fastened at the right side, at the elbow of the right fore leg; the hind legs are thus both on the left side of the trace. The animal can not pull straight, but must of necessity advance somewhat sidewise. It appears like a barbaric and primitive, not to say cruel, way of working them.

Another method used in Lapland is not very different, but yet an improvement. A broad strap or rawhide is placed over the neck; the two ends being lashed together, they are drawn in between the fore legs and fastened to the trace, which passes out between the hind legs and is secured to the sled. The deer thus straddles the trace, and the pressure of the pull comes on the neck just in front of the shoulders and on the brisket.

A more modern style of harness is now also much used in Lapland. Lieutenant Jarvis describes it so fully that I will quote him again, this being the manner in which the deer he used on his Point Barrow trip were harnessed:

They are harnessed with a well-fitting collar of two flat pieces of wood, from which a short trace goes back on each side to the ends of a breast piece, or swingletree, that fits under the body. [It is held up by a strap over the back.] From the center of this a single trace runs back to the sled, either between or on one side of the hind legs. In the wake of the legs this trace is protected with some soft fur, or the skin will be worn through with the constant chafing. Generally there is a single line made fast to the left side of the halter, and with this the animal is guided and held in check.

In Lapland, as in Alaska, there is seldom more than one animal hitched to a sled.

SLEDS.

The illustration (Pl. XVIII) shows two forms of the sled used in Alaska. The nearer sled in the picture was imported from Lapland and is there called a "pulka." It is a style which has been used in Lapland for centuries. It is about 7 feet long and 2 feet broad, pointed in front and square in the back, and generally rounded underneath so as to greatly resemble a boat. It has the desirable merits that it pulls easily and does not sink into soft snow. The front half is covered with deerskin stretched over bows. In this receptacle the baggage of the traveler is placed. A partition in the sled makes it a closed box. Access is had through a square hole in the top closed by a tight-fitting lid. In the back half of the sled is an upholstered low seat with back rest. It takes much experience to keep the seat, as the sled rolls from side to side. The other form of the sled is like the dog sled, or hand sled, in common use. It varies very much, as it is largely home-made. The one here represented is a common type; it is 9 feet long and 2 feet wide, built of thin slats to make it as light as possible, and inclosed by a railing about a foot high.

PLAN OF DISTRIBUTION OF DEER.

The object in introducing the deer is to familiarize the Eskimos with their use and to induce them to breed and to handle them. To this end the following plan has been adopted: The Teller Reindeer Station has been made the headquarters for the Government herd. A general superintendent and the other necessary employees have been stationed here. A number of expert Lapp reindeer men have been employed, who have the handling of the deer and also act as teachers to the Eskimos. The most intelligent young men from the various villages along the coast have been selected as apprentices to learn the art of breeding reindeer. They enter into an agreement to remain from two to five years or until, in the judgment of the superintendent, they have acquired sufficient skill to handle a herd. Meanwhile they are given rations and clothing and get a nominal pay in deer. If they show a lack of interest or are too dull to learn they are dismissed. When capable to handle them the Government will lend them a few deer, from which they can have the increase, but must return the original number loaned within five years. This gives them a nucleus for a herd. The Government also lends herds to mission stations on the same conditions. According to Doctor Jackson's report for 1902 there were then 60 individual owners of reindeer in Alaska, 44 of whom were Eskimos. Some of the mission stations have Lapp herders, who teach the natives, and where this is the case these missions become in effect powerful assistants to the Government. This appears to the writer to be an excellent plan. It helps the missions and at the same time hastens the acquisition of skill among the natives, which is a prime object. By lending deer to those natives only who have taken an interest in the matter and who have learned to handle them the danger of loss from carelessness is reduced to a minimum. The deer owners soon become important men in their respective neighborhoods and others will strive to emulate them. The ownership makes them independent of the ordinary methods of making a living; it teaches them self-respect and self-reliance. The deer also bring in money. The meat on one of them is worth from \$50 to \$100 at the mines and sled deer are worth upward of \$100 each.

DISEASES OF REINDEER.

The reindeer is subject to several diseases, and it is very prone to accidents. In every herd, therefore, there is a certain annual percentage of losses which seem to be inevitable. One of its afflictions is known as the hoof disease. It begins with a lameness, followed by a swelling near the hoof, though the swelling may appear higher up on the leg or even on other parts of the body. The swelling is followed by the formation of pus, which may result in a running sore, followed

by gradual recovery after several months; or the disease may become systemic, when the animal usually dies. Dr. F. H. Gambell, superintendent of the Eton Reindeer Station, writes as follows on the subject:

My belief is that the disease originates in the bones, generally near the articulation; that the inflammation is due to pus-producing germs which find lodgment in the devitalized bone; that gradually the pus "works" to the surface, causing an open sore; that at this time the trouble is localized, but later may become systemic.

Doctor Gambell has noticed a craving for calcium salts, and advances the theory that the disease is due to lack of vitality owing to the great strain upon the system to grow the antlers in so short a time. It might be inferred that giving them access to lime in some form would have a tendency to remedy the evil, but no experiments on that point are reported.

Reindeer are also subject to another trouble, designated as liver-and-lung disease, from which it appears many have died in the Government herd. No remedy has been reported.

They are prone to accident, and many deer break their legs, their necks, or their backs while running about or while fighting with each other.

IMPROVING THE BREED.

It appears to the writer that much could be done in the way of improving the size and strength of the animal, and therefore its usefulness, by breeding them up. The laws of breeding which hold sway in the development of cattle, sheep, and hogs must likewise be applicable in the breeding of reindeer. As has been noted, many of the wild deer are larger than the domesticated, probably because in the former case nature has applied her laws of the survival of the fittest, and the strongest males of the herd, as a rule, have become the sires of the herd. Under domestication these laws could be applied to even better advantage and doubtless with good results.

The abortion of the antlers, which under domestication are not only utterly useless but a decided disadvantage to the animal, is another line in which experiment might be tried with interesting results.

REINDEER AND AGRICULTURE INCOMPATIBLE.

The zone of the usefulness of the reindeer lies wholly outside that in which agriculture is possible. It lives chiefly on the lichen and herbage indigenous to the region where no agricultural plants will grow. It will not thrive in the warmer regions where agriculture is practicable, and it can not live on the kind of forage which we feed to cattle and horses. Wherever the ground can be cultivated its place will be taken by the horse and ox. But it is by far the most useful animal for the region north of the agricultural belt. It is the means of transmuting a vast amount of vegetation into meat and skins necessary to the support of the Eskimos.



KINDS OF SLEDS USED WITH REINDEER.



METHOD OF DRIVING REINDEER.

Illustration loaned by Dr. Sheldon Jackson.



REINDEER CARRYING PACKS.

Illustration loaned by Dr. Sheldon Jackson.



MILKING REINDEER.

Illustration loaned by Dr. Sheldon Jackson.